Mushroom News

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Vol. VII No. 4 **APRIL 1959**

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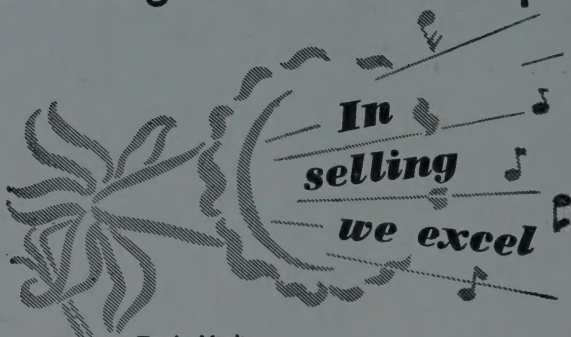

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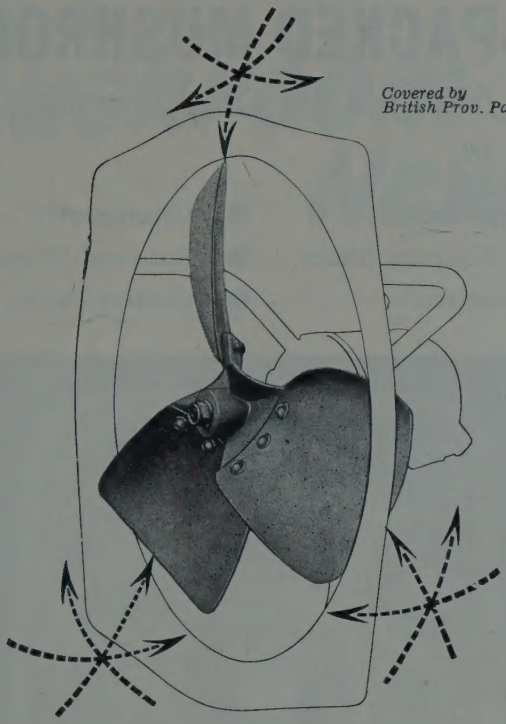

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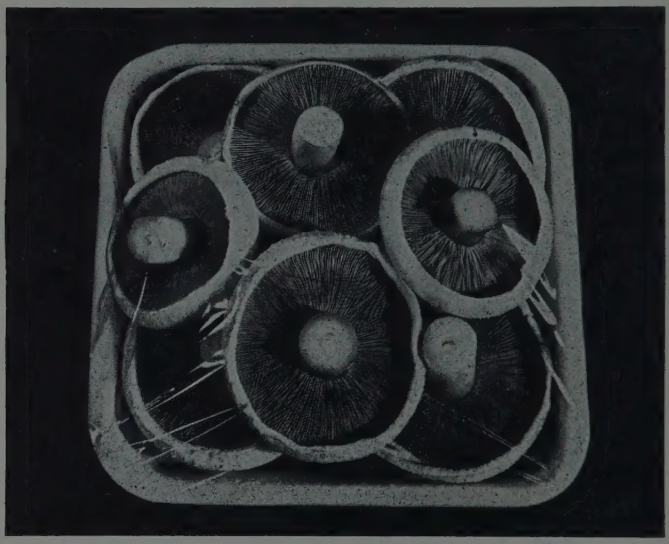

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Mushroom News

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OUR FRONT COVER

At Wrington Vale Nurseries, Congresbury, Somerset, mushrooms are washed by the Ronjonite Process. Our Front Cover depicts two chip baskets, in one of which the mushrooms have been washed, and Mr. Graham Griffiths, who is the U.K. agent for the process, claims they will sell at a premium of as much as 6d. per pound, marketed through normal channels.

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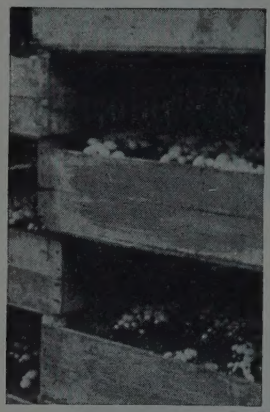

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Mushroom News

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WORTHING ENGLAND

Vol. VII No. 4 **APRIL 1959**

Outlook Warmer

As the year advances and the average temperature creeps up a little nearer to the expected peaks of August, management of the mushroom farm passes through a critical stage. Conditions tolerated during the winter without appreciable effect upon production can cause a rapid deterioration in cropping under the acceleration of a minor heat-wave. It is no coincidence that the greatest degree of consternation over La France, Cecid larvae and Watery Stipe in turn occurred in the late summer and early autumn.

The effects of the summer are felt not only on the farm but also in the markets and the shops. At a time when more mushrooms are being produced, often of low average quality, the demand slackens. The fact must be faced that most mushrooms end in the frying pan despite all the efforts made by the women's press to encourage a spirit of adventure in their readers Raw mushrooms in salads go down well in Mayfair but not in the Mile End Road.

Culturally, the problem is to keep the growing house temperatures within reasonable limits so that other factors can be controlled. Many growers do not realise that it is easier to heat a house than to keep it cool, and with an outside air temperature of 90°F they still continue to pump the hot air in through the ducting, or leave the doors wide open.

A well insulated house should not heat up if the doors and ventilators are kept closed while the sun is up. Change the air at night, when it is cool, and then recirculate throughout the day; provided the air is kept moving over the beds there will be enough in the house to keep the mushrooms thriving.

Consequently the grower should be watching external temperatures, even more closely than house temperatures, ready to cut off the supply of fresh air and start recirculating the moment the critical point is reached. If he can keep the internal temperature down, control of humidity is relatively easy.

The introduction of the Basudin formulations has reduced the danger of fly epidemics to manageable proportions, but it is important to maintain routine dustings and aerocide treatment. Closing the house down will keep out flies, and the use of filters in air intakes at least prevents the pests from being pumped into the house in massive numbers.

So much for growing mushrooms. Improved cropping will lead to more mushrooms reaching market at a time of slack demand, with poor

prices reigning. On page 68 Mr. Clifford King of Heather Farm, one of the largest growers in the country, gives his forthright views on how each individual grower in the industry can do something to increase demand. There has been a tendency for growers to subscribe to the M.G.A. publicity fund and then feel that there is nothing more to be done. Personal effort, whether directed at small local retailers or large city stores, can have far reaching results, and if every grower was to take some practical, positive step to help the man who sells the mushrooms, the benefit would be great.

A hot summer could be a wonderful opportunity to establish mushrooms in many more homes as a staple article of diet. One is always being told of the vast sums of money that are spent on persuading the public to drink more milk and the expense is understandable, for who wants to drink milk? But there are very few people who do not enjoy mushrooms, so there is no need for persuasion. It is primarily a question of getting the housewife to buy mushrooms when they are cheap —her family will see she continues to buy them in the autumn and winter.

Notes and News

Dutch Research

The Mushroom Research Station at Horst, in Holland, will have its official opening at the end of June, although Dr. P. J. Bels and his team have already moved in.

Growers who attended the lectures at the Bournemouth Mushroom Exhibition will recall the photographs and models shown by Dr. Bels of the new station, which incorporates many modern features.

A Record?

Oxford Royal Mushroom Products, Inc. of Kelton, Pennsylvania, recently completed the largest mushroom plant under one roof. The plant has a growing capacity of half a million pounds of mushrooms per annum.

The growing units are side by side in a line 500 feet long, under an aluminium roof. Automatic humidity and temperature controls are sited outside the house on pre-set control panels.

International Congress

Attendance at the Fourth International Mushroom Congress to be held in Copenhagen looks like being a record. The Congress will last from the 18th to the 26th July and already the party of United Kingdom growers numbers 45.

Those wishing to attend should contact the Secretary of the Mushroom Growers Association for details.

Mushroom Biscuits

Miss C. K. Rhodes and Mr. D. H. Hughes of the University of Delaware have been studying the value of mushrooms as an added constituent of bread and biscuits.

Their paper shows that to obtain a mushroom flavour in biscuits by the addition of dried, powdered mushrooms, so much of the powder must be added that the biscuit's appearance is altered for the worse. More satisfactory results were obtained by using fresh mushrooms and monosodium glutamate, al-

though the biscuits had an undesirable after taste. Research continues.

Progress in Eire

The council of An Foras Taluntais has announced that land and buildings have been purchased at Kinsealey, Malahide, so that a National Glasshouse and Vegetable Crop Research Station can be established. The programme of work will cater for the needs not only of specialist growers in the vegetable and glasshouse lines but also for farmers who engage in horticulture as a subsidiary enterprise. Research work on various aspects of mushroom growing will also be a feature of the station.

Future plans for the development of the station include the erection of at least a half-acre of glass, a laboratory and the establishment of a specialist service for Horticultural instructors.

Research Required

Do mushroom stalks continue to grow after the mushroom has been picked? Opinion appears to be divided on this vital point. We have been told by several growers that they *do* grow, while we have been assured by experts that it is impossible. The answer is, perhaps, that the cap of the mushroom changes shape in opening and this may have the effect of pushing the stalk clear of the gills, so giving the impression that it has lengthened.

There is an opportunity here for the statisticians to carry out a measurement programme that may lead to the disappearance of a well-worn excuse for badly graded mushrooms

The Problems of Horticulture

Lord Waldegrave read a message from the Minister of Agriculture when he addressed a conference on horticulture at Droitwich on the 23rd February. On the problems facing growers the Minister wrote:—

"I find general agreement that the most pressing problems in horticulture lie on the marketing side, rather than on the production side. We need an expansion in the market for fruit and vegetables in this country. We need to capture, if we can, a larger share of that market for the British producer. Both require better presentation, better grading, better packing. We need to improve the reputation of home-grown horticultural produce."

Of the new grants scheme the Minister wrote:—"The £7½ million scheme for grants to horticulture is a scheme which has been specially tailored to meeting the most important needs of horticulture today . . . In this scheme the emphasis will be on better preparation of our fruit and vegetables for market."

Farm Factories

Mushroom growers will be interested in the case of Mr. Eggett's broiler houses. The Huntingdonshire County Council set out to prove that the broiler houses—for the raising of 120,000 chickens—were factories and therefore were subject to planning restrictions.

Mr. Eggett gained the day, but it is indicative of the official attitude that he should have to prove that the broiler houses were as much agricultural in purpose as milking parlours or grain stores. Intensive mushroom growing has points in common with broiler production, and it seems only a matter of time before someone tries to prove the mushroom farms are no longer farms but factories.

MUSHROOM GROWERS' ASSOCIATION

LUNCHEON

AND

ANNUAL GENERAL MEETING

24th March, 1959

Growers met at the Connaught Rooms again for the Thirteenth Annual Luncheon of the Mushroom Growers Association, followed by the Annual General Meeting. A report on the processing of mushrooms, and discussions on publicity were the main features of a well-attended gathering.

DETERMINED that this year there should be no complaints of shortage of time for discussion, the Mushroom Growers' Association arranged an early start for their annual get-together at the Connaught Rooms, London, on the 24th March. The Chairman's Reception was timed for 11 o'clock, with lunch at 12 noon! Mr. Frank Bleazard, the Chairman, appeared to achieve the impossible by having all one hundred and thirty members and guests well into the turtle soup by 12.30 and nobody could say that there was insufficient time for discussion at the Annual General Meeting that followed.

This was the thirteenth Annual Luncheon of the Association and the Guest of Honour was Sir William Slater, K.B.E., Secretary to the Agricultural Research Council. Introducing him, Mr. Bleazard said that it was due to his efforts that so much progress was being made in mushroom research at Toddington. Other guests at the high table included Mr. F. W. Toovey, Director of the Glasshouse Crops Research

Institute at Toddington, and Messrs. E. H. Gardner and H. Haynes of the N.F.U. who were, as Mr. Bleazard pointed out, the direct links between the mushroom industry and the Government.

Mr. Bleazard commented that 1958 had been a reasonably good year, although prices had reached the lowest level since the war at one period. A combination of increased cropping areas and better production had resulted in an estimated increase of 50% in production over 1957. Now there was the threat of heavy imports from Holland, although how the Dutch could overcome a 20% import duty and a carriage charge of 3d. per pound and still undercut the British product was a problem that baffled the chairman.

Members could rest assured that the Executive Committee were doing all they could to meet the situation. They were investigating the new position created by the Government's grant-in-aid of seven and a half million pounds to horticulture, and although the details of the scheme had yet to be settled, it seemed in his opinion to be a poor substitute for adequate tariff protection.

In the meantime the average consumption of three-quarters of a pound per head of population in this country must be increased, and only publicity could do that.

After the Loyal Toast, Sir William Slater replied, tracing his connection with mushrooms from the days when he went with his mother to gather the wild variety in the fields. He mentioned his surprise and pleasure at a time when he and his colleagues were trying to "sell" research to the horticultural industry, they had been actually *asked* to help the mushroom industry with their research project, then the M.R.A. at Yaxley.

He apologised for the slowness in developing mushroom research at the Glasshouse Crops Research Institute, explaining that somehow government affairs never seemed to run according to plan. However, all the buildings were now completed and a programme was under way. To the staff already known to growers it was hoped to add a geneticist to study strains of mushroom spawn and find out how far genetics inter-acted with diseases. The station at Toddington was probably the finest centre of mushroom research in Europe, and he outlined the work of the various departments.

In conclusion, Sir William mentioned the mushroom in *Alice in Wonderland*. A bite from one side encouraged growth, from the other, caused stunting. Now the caterpillar who sat on the mushroom had told him that there were in fact four sides, including sections that would make the biter fat or thin. Seeing here an opportunity to boost the mushroom as the finest slimming food of all time, Sir William asked the caterpillar exactly where the slimming side was, only to be told "I thought *you* were the secretary of the Agricultural Research Council"

After lunch members collected for the Annual General Meeting, and listened to their Chairman's report. Covering the events of the past twelve months, Mr. Bleazard regretted that it had been possible to hold only three farm walks and area meetings, owing to production troubles on members' farms. The Exhibition, held at Bournemouth, had been a great success and he announced that there would be another Exhibition for 1959, to be

held at Folkestone in October. For 1960 a conference on the same lines as that at Southport in 1957, was planned.

Another event in 1959 that would attract members was the International Mushroom Congress, to be held in Copenhagen. A long list of well-known speakers and a round of visits had already been arranged.

After Mr. Winston Alderton, the Secretary, had reported that membership figures were much the same as for the previous year, and Mr. Filmer had explained that all was well on the financial side, Dr. R. L. Edwards delivered his report on mushroom processing. Readers will remember that twelve months ago Mr. F. C. Atkins put forward a proposal that an M.G.A. Processing Plant should be set up to relieve the situation in times of glut.

As was only to be expected, Dr. Edwards' report was a model of painstaking research. Questionnaires had been sent out to members and salesmen to ascertain facts and obtain opinions, and from those completed and returned, Dr. Edwards had distilled certain conclusions. He was surprised at the weight of mushroom stalks marketed —about 3,600lb. per week from some 30 growers. However, not one of the salesmen thought that the average price of mushrooms would be affected by the removal of stalks from the market.

Turning to inferior quality mushrooms, Dr. Edwards estimated that some 20,000lb. per week was the output of the industry. In this case six of the salesmen thought that the removal of the inferior quality mushrooms would have no effect upon the price, while fourteen thought it might raise the average price by from 3d. to 1/-.

Opinions from the salesmen were conflicting, but it seemed that the glut period was from the middle of June to the middle of July, and in general they agreed that gluts were caused by a combination of over-supply and under-demand.

Giving the implications of his study, Dr. Edwards said that owing to the highly seasonal nature of the glut, a great deal of working capital would be required, for the mushrooms would have to be bought at the time of the glut, processed and then held in stock, perhaps for months, before being sold. He estimated that on the figures given some £20 to £30,000 of working capital would be locked up in processed mushrooms awaiting sale.

In conclusion he said that as some had visualised, it would be of great assistance if the mushrooms could be held in preservation between picking and processing, so that the actual canning could be spread out. He advised that if anything was planned, the project should start slowly and on a small scale, regulating throughput to quantities that they knew could be bought, processed and *sold*.

Mr. Dumbreck, who visited mushroom growers in the U.S.A. and Canada last summer mentioned that over there only the best quality mushrooms were canned. At this point Mr. F. C. Atkins asked why the TV. films made about mushrooms, to be shown during the glut period, made no reference to raw mushrooms in salads. The Chairman firmly steered the discussion back on to the rails again and called for Mr. Berry's report on Publicity in 1958.

Mr. Berry said that the committee had decided to appoint their

Sir William Slater, K.B.E., Guest of Honour at the Luncheon, replying to Mr. Bleazard, the retiring Chairman.

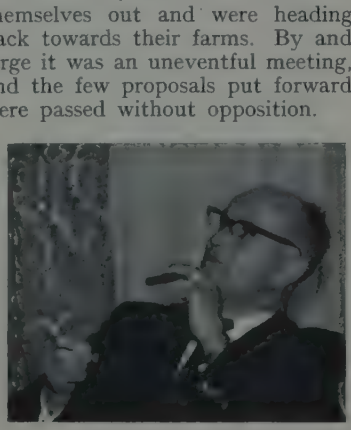
own public relations officer, and Miss Anne Pascoe now filled that position. She would work through N.F.U. channels, so obtaining the widest dissemination of matter at the least expense. He listed the various activities of the Publicity Sub-Committee, and said that a library of photographs and of mushroom recipes had been established. To follow up the highly successful mushroom "Valentine" sent to lady editors and journalists, they were now distributing mushroom aprons.

The most controversial point in his report was the decision to embark on a £4,000 TV. programme. Three films had been prepared, with seven seconds of vision and five of sound, and would be shown in 55 "spots" during July and August in the Midlands area. Assessments would be made before and after the broadcasts to ascertain what effect this form of publicity would have.

Mr. Atkins again asked why the films did not include reference to raw mushrooms. Mr. Berry said that the films had been made after consulting expert opinion on the medium. The Midlands liked fried foods, and in the time available it would not be possible to educate them into eating mushrooms in a completely new form. There was some discussion as to whether the experts consulted were really experts, or whether the opinions of the Wine and Food Society might be taken as representatives of the Midlands ITV. area eating habits. However, it was decided to leave the films as they were.

Mr. Clifford King said that in his opinion the publicity attack must be directed at the point of sale. The greengrocers must be educated to cut their profit on mushrooms, so increasing their turnover enormously. He told of an experiment carried out by his company last summer during the glut period in point of sale publicity which had given the most surprising and heartening results (for full report, see page 68).

At 5.30, with the room booked for another hour, members had talked themselves out and were heading back towards their farms. By and large it was an uneventful meeting, and the few proposals put forward were passed without opposition.



Mr. F. Bleazard listens attentively to Sir William, who is Secretary to the Agricultural Research Council.

Publicity . . . .

DO IT YOURSELF

says

Clifford King

Mr. Clifford King, of Heather Farm, Woking, is already well-known to readers of this journal for his contributions on mechanisation. Here he gives some original views on tackling the problem of selling mushrooms during the glut period. He feels that there is a great deal more that mushroom growers can do to foster sales, but it is up to the individual to act by direct contact with the point-of-sale, and educate as many retailers as he can in his product.

In my opinion mushroom publicity should be aimed at two targets. The first has been well peppered with shot by the M.G.A. Publicity Committee and there can be few journalists, lady editors, cooking instructors and suchlike that have not been "educated" in mushroom dishes.

The second target must be the housewife at her most vulnerable. That is when she is standing outside or inside the greengrocers or multiple food store, trying to decide what to buy.

A great deal of time and money has been spent by research organisations studying women's buying habits. They hide cameras behind the packets of detergents in the chain stores, photographing eye-movements. They use varigated coloured packs to find out how presentation affects sales.

They have discovered that impulse-buying accounts for a large proportion of sales. When the housewife enters the shop she has no intention of buying a packet of "Whizzo". Then she sees it on the shelf and it is displayed in such a way that she buys a packet on impulse.

But when she goes into the greengrocers it will be remarkable if she sees mushrooms displayed. Probably there are a couple of chips tucked away behind a pile of oranges. If they bear a price label at all, it will be around 1/3d. or 1/6d. a quarter whatever the quality of the mushrooms.

What can be done to educate the retailer in selling mushrooms? He

has got so used to buying small quantities and selling them at a high price that he does not appreciate what a best-selling line they can be, properly handled. If mushrooms are cheap they sell easily, and last summer I carried out an experiment to prove my point.

We had a spate of very small and 2nd Grade mushrooms. These we offered to a small retailer at 2/- per lb. and he took a small profit, reselling at 2/6 per lb.

Our price was not high, but an excellent one when you consider that they were poor quality and there was no carriage, commission of baskets to be deducted. 6d. per lb. profit no doubt seemed small to the retailer compared with what he usually reckoned to charge.

But look what happened Within days he was selling up to 1,000 lb. per week—and has continued to take all our 2nd Grade mushrooms since then.

And here is the pay-off ! His sales of 1st Grade mushrooms have more than trebled, selling at a maximum of 5/- per lb. As a result of reducing his profit margin he has been amply repaid in greatly increased sales of mushrooms.

This summer we plan to increase our activities by "educating" more retailers in simple economics. Further, we plan to help them by giving them attractive price tickets that will draw the customers' eyes to the bargain to be had in mushrooms.

It is obviously impossible for growers to market more than a small proportion of their produce direct to retailers. The bulk of the mushrooms must still go through the wholesalers.

But if every grower was to "educate" several retailers in his district by a little personal attention as we have done, then gradually the ripples will spread out across the country. Women will get the mushroom habit and will demand mushrooms from other retailers and will no doubt be rude if the price is too high.

What is more, the taste for mushrooms will continue after the summer glut has passed. The family will have taken a liking to mushrooms with bacon for breakfast, and will go on asking for it even after prices have risen.

Now this is something that every grower in the country can do himself and at very little expense. In fact, if he goes about it the right way he will be well in pocket by the autumn, and made his own contribution to an increased demand for mushrooms.

Mushroom publicity will always have to work on a limited budget and I think that what money there is available should be spent on indirect methods such as those already carried out with great success in the past. Direct advertising in the form of TV spots and newspaper advertisements need enormous financial backing if they are to have any effect.

But I have shown—and there are many others who will back me up on this—that the biggest inducement to buy mushrooms is a low price in the shop and an eye-catching display. If we can only get the idea going, more and more retailers will have to fall into line.

Publicity of this sort is within the power of every mushroom grower, big and small. It is an effort well worth making, not only measured by immediate results during the glut period, but by long term results that will benefit the whole industry.

So get out there now and educate your retailers.

I SELL MUSHR

A Retailer's Point of View

Too many mushroom growers lose interest in their product when it leaves for market, and then complain of poor prices. In this article Mr. H. Ososki, who runs an expanding retail business, sets down his views of mushroom marketing seen from the other side.

Not long ago a lady, a regular customer, came into our shop, delved into her shopping basket and produced with a flourish two magnificent symmetrically perfect specimens of fungus. "Tell me" she enquired, "can I eat these?" Taken aback by a question which I was eminently unqualified to answer I paused, then said "Certainly you can eat them if you wish, but I cannot guarantee that you will wake up the morning after". The partaking of mushrooms has always and I suppose always will give to a number of people a feeling of imimpending doom by virtue of the fact that they believe a "poisonous one" will somehow find its way on to the breakfast or dinner plate, a state of mind not allayed by this actually occurring periodically, usually when townsfolk go mushrooming while on holiday. However, that should not worry us unduly as we are only concerned with the scientifically produced article which, when expertly grown, harvested and packed, handled with care in transit and displayed with intelligence will produce very favourable reaction from the shopping public.

I must state first of all that, much to my regret and disgrace, the nearest I have ever been to a mushroom farm is the array of chips on display in the wholesale markets, and this should be borne in mind if any comment or suggestion I make be at variance with general grower opinion or tested farm practice. I should like to offer the following points for the consideration of growers. These represent what retailers in general agree might improve the standard of presentation.

(i) **The length of stalk** is, I think, the chief cause of adverse comment and is confined neither to specific growers nor to any particular grade. I don't profess to know what instructions are given to the pickers, but greater care might be taken to ensure that the caps are trimmed to the accepted length. At any time it is possible to see stalks up to 2in. long even on some button sendings while many opens present a sunshade-like appearance. I could understand it if what was removed had to be thrown away, but there is a definite trade for stalks wherever mushrooms are sold wholesale. Staff shortage or inexperience could be contributory though hardly valid reasons. Some sen-

OMS

by

H. OSOSKI

ders have never failing standards of stalk length whether of button, cup or flat, and besides enhancing the appearance and therefore the consumer appeal, this must encourage a slightly higher return. It might sound odd to growers, but quite a few people throw away the stalks when preparing mushrooms for a meal.

(ii) **Unclean produce** is a source of great concern to retailers of quality mushrooms. One usually pays considerably more for buttons or cups than for the remainder of the crop and in doing so a buyer expects his produce to be of impeccable appearance. This is often spoiled by the caps being smothered with tiny particles of peat or soil. I understand that this is caused by the final waterings being given at too great a pressure, a fault which should be easy to rectify. At the same time chips of peat-splashed caps are frequently topped with a layer of clean mushrooms, not a very gentlemanly habit, you will agree. One chip of best buttons I had recently contained on the bottom what appeared to be coal dust, probably caused by standing empty chips on a pathway in readiness for filling.

(iii) Every year during the summer months there is a spate of *phorid fly larvae riddled produce.* I have been bowled out myself through not examining my purchases with proper care. In fact, this is easy enough to detect and produce thus infected should never get as far as the markets. Some housewives who find larvae affected mushrooms when preparing a meal are likely to delete this item from the shopping lists for a considerable time thereafter, while others return them to the shop with righteous indignation.

(iv) **Refrigeration.** I cannot say for certain whether any grower whose produce I take employs this medium, but I have very strong suspicions that mushrooms are more widely refrigerated than one would believe. The symptoms seem to be a rapid discoloration to a dirty, drab brown—not the bright colour of a "brown" mushroom. This is most disconcerting and at all too frequent intervals my beautiful top price buttons turn colour so quickly that I immediately suspect them to have been in the cold room. Appearance is thus ruined and housewives who are accustomed to seeing persil-white caps in

Length of stalk is the chie, cause of adverse comment. The cups should be trimmed so that the stalk can just be held between the fingers.

shops like mine will not touch them. All we can do is to drop the price and get rid of them quickly, not a satisfactory solution when high standards are desired. I hope someone will correct me if my assumption of the cause of this discoloration is incorrect.

(v) **The mixing of grades** or incorrect designation can be a bit of a nuisance except, of course, when consigned as "Mixed". Sometimes, for particular culinary dishes, buttons cannot be used where broilers are wanted and vice versa.

(vi) **Overpacking and short weight.** Probably with a view to economy, growers sometimes send away consignments of chips containing more than their recommended weights, e.g. 4lb. in a 3lb. chip. While this may pass comment if every chip were given kid-glove treatment, it might not be realised that when so overpacked the slightest jar or jolt will then cause a number of broken mushrooms, the quantity receiving damage depending upon the degree of shock. Far better to pack less per chip and get them there undamaged. Short weight is a national failing among producers, mushroom growers being no exception, but after long years of experiment I must say that since dealing almost exclusively with one particularly large handler in a London market we have never found short weight although we weigh every chip purchased. This could be due to an initial understanding between producer and agent. If so, it is a course that should be followed by all. In the past I have had some grievous weight shortages and I believe this is due simply to lack of care at the farm as in two instances I took the liberty of communicating directly with the growers concerned since their names were printed on the chips, and both expressed what was obviously genuine surprise and dismay. However, as most consignments bear only code numbers, direct complaints are not always possible and reference to the agent does not necessarily bring forth a remedy. On one occasion I raised this matter with a senior salesman concerning short weight from a very well-known mushroom producer and he told me that if he passed back complaints he might be deprived of future sendings. Most uncooperative and shortsighted on the part of somebody.

Having left the farm the produce is mostly sent by rail to the markets, although I have seen some delivered by motor van. The mushroom trade, compared with the rough and tumble of the fruit and vegetable sections, is a most sedate organisation, no panic, no raised voices or loud argument between salesman and buyer, all is conducted in an atmosphere of good manners and decency. In contrast to the normally harsh treatment meted out to deliveries of other produce, I don't think I have ever seen mushrooms deliberately treated other than with normal consideration. Railway employees, market goods inward porters and delivery men alike, seem to have a sneaking regard for these spick and span, harmless little packages, and the care bestowed between farm and shop is apparent in the almost complete absence of damage to purchases, excepted only when overpacking takes place. Relations between salesman and buyer are mostly cordial and intimate to the point where even modest requirements are known and remembered by a salesman who handles hundreds of chips a day from many sources. Each buyer, too, actually handles and examines all he buys as against opening one or two boxes of fruit at random and trusting to Providence that those you've bought will correspond in quality and type to those inspected. I think that the chip basket and its successor made of cardboard cannot really be improved upon especially as both are quite pleasant in appearance and can be placed in any window display, however immaculate, without detracting from its balance and beauty. In fact, because of the care usually taken in packing, this procedure is best and most retailers display and sell in this manner. Some do tip out masses of the cheaper types into window display trays, giving a large exhibition usually of mixed flats, not a very pretty picture to my way of thinking.

Since the three sections of the trade—producer, agent and retailer—are of necessity interdependent, and if I may say the grower's barometer depending to a considerable extent upon what retailers do, and how and when they do it, growers should make themselves aware of what takes place in retail circles, follow trends of fashion and offer their views. In this respect the sale of mushrooms by retail is becoming defined into three sections, fresh produce, canned or tinned and quick frozen. The vast majority of fresh mushrooms are sold "loose", invariably marked up at $\frac{1}{4}$lb. price and although from the

The acid test. Salesmen and buyers examine produce in the early hours at Covent Garden.

grower's viewpoint I think this is the best way, some are now being pre-packed into units for sale in self-service and chain stores. The usual method seems to be to buy either in the markets or directly from the grower and pack into small, pressed cardboard trays overwrapped with sheet cellophane. Of the samples I have obtained from time to time from well-known large self-service retail shops none has been offered for sale by weight nor even by an approximate weight, and on weighing I have found that the price as compared to that of equal quality "loose" has been about double, which to my mind is well out of proportion. By thus increasing the effective retail selling price (without any change in the wholesale price) this must by the usual economic laws slow down the demand for an article which is not in short supply and this will travel back to the growers themselves to their ultimate disadvantage. As the self-service fashion does not yet appear to have reached its zenith, growers should view this statement at least with some sort of interest.

Future Trends

In view of the indisputable trend towards prepared foods, I believe a much brighter future lies in the canning and more particularly the freezing of mushrooms. As regards canning, the French have reduced this to a very fine art, and if growers are keen enough and interested in the possibilities offered I would commend them to buy a tin of good quality "Champignons de Paris" and see for themselves the super grading of these choice buttons. From my experience only the best buttons are used, are usually marketed in 8oz. drained weight tins and are packed to unbelievably rigid grading. Geared to production for this specific purpose I think it might be possible for home growers and canners to improve upon the price of imported 'rooms, at present round about 4/- to 4/6d. per 8oz. tin retail, which is a little out of reach for the majority and probably a little too large.

Quick-Freezing

When quick-frozen mushrooms were put on the market in this country recently, I obtained a trial quantity from my frozen food wholesaler but was most disappointed to find that the pack was so small, 2½oz. net weight, that the mushrooms themselves were mostly of pin head size which are not popular, gave a poor impression and were too expensive by comparison with the fresh produce. I believe quick-frozen mushrooms could fill the gap during the summer months when fresh mushrooms sag so rapidly if only the standard was high enough and the price not too much out of line with the fresh counterpart. Many, many people now look to the quick-frozen cabinet for inspiration, and in view of this I hope more growers will look into the possibilities of freezing. Please remember, however, that it is useless considering quick-freezing surplus produce. It must be an operation in its own right, of standards rigid or even more rigid than the highest at present adhered to for fresh produce and, very important, a steady unfailing supply. That, and a mushroom campaign with a little introduction to the public to herald its arrival and I see no reason why mushrooms should not take their place alongside frozen peas the outstanding example of what the quick-frozen industry can accomplish for a worthy candidate.

PESTS OF THE CULTIVATED MUSHROOM

No. 5 SPRINGTAILS

Springtails are still a problem to growers putting down autumn crops in greenhouses and rhubarb sheds, especially where peak heating is impractical. In the fifth in his series on Pests, Martin D. Austin deals with the Springtail and the ways of coping with infestations.

Of the many insect and allied creatures that from time cause direct damage to cultivated mushrooms, or to the developing mycelium, those known as Springtails are the most primitive. Nevertheless, it is mainly due to their primitive nature and habits that they are so much at home in a range of situations including those associated with commercial mushroom growing.

As far as environment is concerned their needs are simplicity itself. For instance many species occur in profusion in dark and and semi-dark conditions. They thrive in vegetable compost heaps, in accumulations of dead and rotting leaves, and sometimes under the bark of trees. In this connexion "stands" of unbarked wooden stakes, particularly where the bark is gradually breaking down, offer congenial living quarters to certain springtail species. The soil itself, especially if it is carrying vegetation either as weed growth or a normal crop, is quite often well populated with these insects. They are frequently to be found in damp or even wet situations, and on and in plant debris of various kinds. Springtails, for all their primitiveness, have thus successfully and over a long period become almost universally occurring individuals.

Quite frequently Springtails are found on living plants apparently causing no recognisable injury, existing on a minimal diet of organic debris. Certain species are noted as commonly occurring on the foliage of black currants: apparently wandering aimlessly on the lower leaf surface. They could, in fact, be acting as scavengers.

In some instances springtails are relatively important pests of crops such as clovers and indeed they have a major pest status in some countries.

Generally, the potential or actual springtail population in garden and farm is great, and where intensive commercial cultivation of a particucrop is the order of the day these small insects often abound.

Environments such as that afforded by a cropping cucumber house, where straw compost may be liberally employed to conserve moisture and supply plant food and where both temperature and humidity are relatively high, favours springtail development and readily leads up to a considerable population build-up. Thus it is not surprising

that glasshouses, either when cropping or when "empty", often support massive populations of springtails. Even old, disused buildings are a home from home for springtails: thus buildings converted to commercial cultivation of mushrooms may initially be heavily infested.

With some species of springtails a characteristic feature of their economy is their occurrence from time to time in large swarms.

On some mushroom farms, and before the normal number of turnings of the compost have been undertaken, the outside of the compost heap may suddenly be almost covered with springtails. Under certain conditions springtail species occur in heaps and then are given such mis nomers as "gunpowder mites". Nevertheless, they are springtails. Their name is well derived since a characteristic feature of their locomotion, is their ability to make quite prodigious leaps. These leaps are made possible by the presence of a peg-like projection on the underside of the body with which the tail portion makes efficient contact—the quick release of the tail results in a leap or spring!

ACHORUTES THE MUSHROOM SPRINGTAIL

Whilst much of the foregoing account is background information it serves to underline the probability that these individually insignificant insects can occur in any mushroom unit at some time or another and return even though routine control measures have apparently eliminated them.

Quite often the buildings used for mushroom cultivation are extensive and they often offer a very satisfactory habitat for many springtail species.

The very fact that commercial mushroom growing largely depends on straw and straw derivatives as the basis of the compost extends an open invitation to organisms such as springtails, and the spawn, developing mycelium and the mushrooms themselves are equally attractive to these small insects.

At times their presence is either unsuspected or not always appreciated to the full. Thus a springtail population may build up over a period almost unnoticed until the sheer weight of an attcka thrusts itself forward as a factor of real significance.

In this connexion it has often been noted that where routine measures for the control of fly pests have ceased, springtails, sooner or later, appear in numbers. In such cases it is more than likely that they have been reduced and kept to a low level over a period only to emerge as a real threat when given a chance.

Springtails are produced from eggs, usually off-white in colour and quite often are laid in the casing medium. These eggs hatch relatively quickly and the young, soft-bodied Springtails, are exact replicas of their parents. They feed quite voraciously when possible and not having an intermediate or pupae stage, soon reach maturity. Even although mortality may be high, successive generations help towards fairly rapid build up, particularly when the environment is suitable.

Such an environment is the mushroom compost itself, but the neces-

sary and vital heat produced during normal fermentation results in much Springtail mortality, and thus it is normally unlikely that the final product of composting will be supporting many Springtails. Without doubt, most of the insecticides added to the compost during its making, control Springtails. Once within the mushroom cropping unit however, the compost attracts Springtails, either from its immediate surroundings within the building or from outside.

LEPIDOCYATUS
THE SILVER SPRINGTAIL

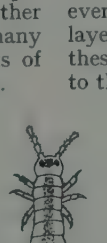
At this point it is relevant to recall that B. D. Morton in *The Grower*, May 25, 1957, writes that "Modern methods of mushroom growing usually prevent springtails from becoming serious pests, but they can still give us unpleasant shocks". Nevertheless, there are still some growers who feel that Springtails represent a very limited or even no risk at all.

In work at Wye in the 1930's, and the much earlier work of Synes and Chorley, a number of Springtail species were identified as being responsible for actual damage to cultivated mushrooms in this country. Elsewhere in Europe, America, New Zealand and other countries, Springtails have for many years been considered as insects of pest status in mushroom houses.

As far as we are here concerned, of the several species met with within or around mushroom units, one, namely, *Hypogastrura armata*, is a typical and important example. Approximately 1/16in. in length, with its colour ranging from silvery-grey to bluish-black, this widespread species is often found in association with "wild" mushrooms and certain other fungi, particularly those growing on dead wood.

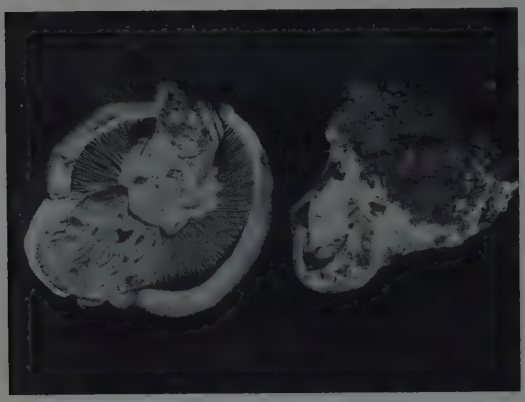
Since, there is no pupae condition, each individual Springtail has an effective feeding stage from the time it hatches from its egg until it dies. This feeding, which to the mushroom grower, represents real damage and loss, is upon spawn piece, grain spawn, developing mycelium and characteristically to the mushrooms themselves.

Because of their relatively minute size, these Springtails can with ease and facility, burrow their way quickly down through the casing medium into the compost and so to the spawn pieces. There any extensive feeding reduces crop potential and, especially should the Springtail numbers be high, can naturally seriously affect the spawn run. In any case, at least temporarily, the full run of mycelium may be inhibited, although, in the case of a moderate attack of this kind, a successful mycelium run may result, even though it be somewhat delayed. Later in the life of a bed, these insects transfer their attention to the mycelium itself.



ISOTOMA
THE SPAWN SPRINGTAIL

The actual amount of injury is related to the intensity of the attack and the number of Springtails present, but sooner or later, as the buttons develop, and more particularly should the build up of *Hypogastrura* con-



Serious Springtail damage, the result of a heavy infestation.

tinue unchecked, these mushrooms are themselves attacked. The buttons are sometimes literally invaded by numbers of Springtails, with the result that they are completely hollowed out and rapidly collapse. With this rapidly increasing above-ground attack, it is possible to find all stages of the Springtail occurring together: eggs, young forms and adults.

Occasionally something approaching total loss of crop may result from the type of attack just mentioned, but normally flushes of mushrooms appear in due course, although cropping may well be eneven. However, these developing mushrooms are still very vulnerable, even though they have moved from the button stages, for stalks are invaded and tunnelled, the tunnels often extending well within the cap region.

In any event the final result is some loss of crop, a reduced potential, and a severe down-grading of the mushrooms as picked.

As to the actual practical control measures for Springtails, despite the fact that they are very susceptible to certain insecticides, including BHC and nicotine dusts and spray, the risk of a re-infestation of a mushroom unit must be recognised as being a possibility.

Primarily, efficient composting goes a long way to ensuring Springtail control, for temperatures of 135-140°F. appear to kill them off quite rapidly. Further the use of the BHC dusts incorporated into the composts at the normal 4 to 5lbs. or possibly 6lbs. per ton, as we noted with Sciarid control, is worthwhile.

Indeed, generally, any direct measure to deal with fly pests, should also affect these much less robust Springtails. Thus the use of a 6% nicotine dust or an appropriate dilution of a nicotine spray on the outside of the compost heap, just prior to the final turning, holds down Springtails. Should Springtails be noted during the period covered by spawning and casing routine, dusting with BHC every 5 days or so is of benefit.

In addition to BHC spraying, such materials as Diazinon and Malathion dusts are commonly used during the cropping period, particularly after a flush has been handled.

A spraying with an appropriate dilution of TEPP is often successfully resorted to in attempts to kill off these pests even when the beds are cropping.

Abroad, particularly in the U.S.A., an appropriate fumigation of the compost at peak heat gives a satisfactory clean-up of this pest.

However, the employment of DDT formulations has generally met with

but scant success and is thus often of but little worth to mushroom growers.

We here touch lightly upon the all-important matter of hygiene within and around the mushroom unit. All we need emphasise is that, as ever, hygiene is of great importance.

Finally, and once again, we put the matter of Springtails as pests of cultivated mushrooms in its proper perspective, we would suggest that with an ever-increasing weight of cultivated mushrooms reaching the market in modern type pre-packages, the need for an even more stringent control of mushroom pests is required.

Such control has always been necessary, not only as a matter of economics, but as a matter of retaining the good faith of a consuming public.

It could be that today's pre-packs call for even more vigilance in connexion with mushroom pest control.

SAWDUST COMPOSTS

Work has been carried out at the University of Florida by S. S. Block, G. Tsao and L. Han of the Department of Chemical Engineering, on the production of mushrooms from sawdust. In Japan *Cortinellus shiitake* has been cultivated on logs for centuries, the fungus digesting the wood directly without need of a composting process.

In the experiments with *Agaricus campestris*, the wood was prepared by composting according to usual practices. Gum wood sawdust was the basis of the compost, fortified with mineral salts and soybean meal for nitrogen. Corncob meal was added to stimulate fermentation and rapid heating.

Three conical heaps were formed, two having sawdust as a base, the control consisting of a standard compost of corncob meal, hay, chicken manure and minerals. The piles were turned three times in twelve days and then pasteurised for two days at 130°F. On the fourteenth day the trays were removed to the high-humidity growing room and spawned.

The sawdust composts produced one-third less mushrooms per tray than the cob-hay compost. On the basis of the weight of ingredients employed, however, the yield of mushrooms from the sawdust was greater and about 85% of the mushrooms were produced in the first two months compared with only 65% for the cob-hay compost.

The results showed an average yield of .71 pounds of mushrooms per pound of dry ingredients from the compost of sawdust and corncob meal, and 1.13 pounds of mushrooms per pound of dry ingredients from sawdust and hay. This compares favourably with Sinden and Hauser's reported yield of .4 pounds per pound of dry manure, and Lambert and Ayers, who gave .9 pound per pound of dry manure.

In view of the large quantities of sawdust available in the U.S.A. at low cost, the experiments show that the use of sawdust offers a potential saving of not less than 23%, and as high as 55% over conventional composts.

Some items of interest from our Postbag

Temperatures

What is the effect of prolonged high temperatures in the cropping houses? How do they affect spawn growth and mushroom production?

The greatest effect of high temperatures in a mushroom house is to speed up the growth rate of the spawn and, by so doing, to increase the rate of metabolism. This means that the rate of respiration produces much greater amounts of carbon dioxide. Experiments have shown that the carbon dioxide produced by compost and casing soil containing mycelial growth increases with rising temperature as follows:–

At approx. 60° F.—5 units of CO_2 per hour

At approx. 70° F.—12 units of CO_2 per hour

At approx. 80° F.—25 units of CO_2 per hour.

Evidence by Mader also shows that carbon dioxide is not the only gas produced—some form of hydrocarbon is also present.

These end products of respiration are heavy gases and tend to lie tenaciously on and just above the casing layer where they form a "micro-atmosphere" in contrast to the air in the rest of the house which forms the macro-atmosphere". It is to remove this overlying micro-atmosphere above the casing that air movement in the house is necessary. In the case of trays relatively violent agitation of the air in the house may be necessary, and even then may produce only a slight dispersion of the stagnant air immediately above them.

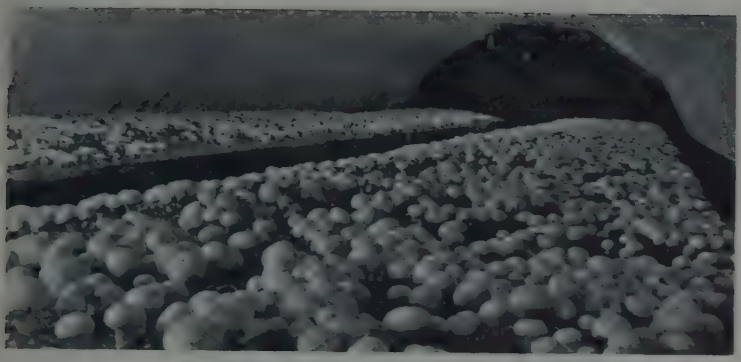
High temperatures also encourage diseases and pests. In the case of diseases, particularly their effect on the crop, depend on whether the spawn or the competing fungus mycelium outgrows the other. At reasonably low temperatures (60°F.) mushroom spawn grows normally; most disease mycelium grows slowly. If the temperature is raised 10° it will be found that while the spawn growth rate increases, that of the disease also increases but many times faster. Prolonged high cropping temperatures thus materially reduce the narrow safety margin which, given a good quality compost, normally exists between mushroom spawn and diseases.

Through Spawning

What is meant by 'through spawning'?

The original method of spawning with grain spawn is to ruffle the grains into the top two inches of compost, which is then firmed down.

Practical experience shows that an increase in the number of growing points within the compost leads to quicker mycelial growth and consequent speeding up of cropping. Through spawning therefore consists of mixing the grain spawn throughout the compost, coupled with a heavier rate of spawning. Spawn run is much more rapid, and nett results are proportionately greater.



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If you use Racing Stable Manure, or other manure in which excess straw is present, the use of Adco "M" is strongly advised. The fermentation of this type of manure takes place more rapidly and effectively when Adco "M" is added. You get a more thorough breakdown of the strawy material, which then becomes available as food for the growing spawn. So your compost provides more nourishment for the mushrooms, and you get a bigger crop.

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Blackburn

SOMERS & GIBSON, LTD., Wholesale Market, Blackburn. Tel.: Blackburn 44956. Telegrams: Harty, Blackburn.

Bradford

HENRY BROOK, St. James' Market, Bradford. Tel.: Bradford 21871. Telegrams: Gooseberry, Bradford.

Covent Garden

BROOME & GREEN (LONDON) LTD., 27 James Street, Covent Garden. Tel.: Temple Bar 7856 Telegrams: Bourgaize, London.

CHARLES KNIGHTS, LTD., 501, 2, 3, 4, 5, Central Market. Tel.: TEMple Bar 5272, 9867.

Leeds

J. WOOD & SONS, Kirkgate Market, Leeds, 2. Tel.: Leeds 30138. Telegrams: Woods, Leeds 2.

Manchester

SOMERS & GIBSON, LTD., Smithfield Market, Manchester 4. Tel.: Deansgate 3666. Telegrams: Muscatel, Manchester.

FRED BRIDGE, Smithfield Market, Manchester 4 Tel.: Deansgate 4835 & 2802. Telegrams: Fred, Bridge, Manchester. Established 1888

Sheffield

C. SNOWDON & CO. LTD., Castlefolds Market, Sheffield. Tel.: Sheffield 25285 and 25286. Telegrams: Snowdrops, Sheffield.

Spitalfields

CHARLES KNIGHTS, LTD., 220, 2, 3, Brushfield Street. Tel.: BIShopsgate 6848/9.

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Wakefield

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